

## RE: Exposure Calculation for Marysville Cohort

Bob Benson to: Bill Brattin

11/05/2008 07:14 AM

From: Bob Benson/R8/USEPA/US

To: "Bill Brattin" <brattin@syrres.com>

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If what you say is true, then IRIS should never adjust an occupational study to a 7 day week. The asbestos IUR was adjusted by 140/50 (ie, 20/10 x 7/5)

If we used the average fibers/cc across the work areas for each worker, then we would adjust by 5/7 x 10/20 to normalize to continuous exposure as the first step in deriving the RfC. The process should not be different if we are using cumulative exposure.

"Bill Brattin" <brattin@syrres.com>

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11/04/2008 11:02 AM

To Bob Benson/R8/USEPA/US@EPA

cc

Subject RE: Exposure Calculation for Marysville Cohort

I believe that the cumulative exposure values assigned in the Lockey study (and every other eidemiological study of asbestos-exposed workers) are calculated by summing the average exposure concentration for each year of work across all years of work:

$CE \text{ (f/cc-yrs)} = \text{SUM of all } C(i) \text{ values, where } C(i) = \text{concentration the worker was exposed to in year } i.$

Note that the value of  $C(i)$  is the average concentration in the workplace area where the worker was employed in year  $i$ . It is NOT adjusted to account for how many hrs/day or days/year the worker was present.

For example, assume a person worked in Location A for 5 years and in Location B for 3 years. The concentration in Location A is 0.7 f/cc and the concentration in Location B is 2.0 f/cc. In this case, the cumulative exposure of that worker is  $5 \times 0.7 + 3 \times 2.0 = 9.5$  f/cc-yrs.

If this is correct, the exrapolation of the RfC based on the data in workers to a value in residents is done in one of two ways:

Option 1: Adjust by the ratio of air breathed per year

Resident:  $20 \text{ m}^3/\text{day} \times 350 \text{ days/year} = 7000 \text{ m}^3/\text{year}$

Worker: 10 m3/workday \* 250 workdays/year = 2500 m3/year  
Ratio: 7300/2500 = 2.8  
RfC(resident) = RfC (worker) / 2.8  
                  = RfC (worker) \* 0.36

This is the approach used by IRIS to extrapolate cancer potency factors from workers to residents.

In your case, because your workers worked longer days and more days, you would make the conversion using your best estimates of hrs/day and days/year. For example, you might calculate the adjustment as follows:

Worker = 1.25 m3/hr \* 10 hrs/day \* 300 days/yr = 3750 m3/hr

Ratio = 7000/3750 = 1.87  
RfC(resident) = RfC (worker) / 1.87  
                  = RfC (worker) \* 0.54

Option 2: same as above, except that breathing rate is not used

Resident: 24 hrs/day \* 350 days/year = 8400 hrs/year  
Worker: 8 hrs/workday \* 250 workdays/year = 2000 hrs/year  
Ratio: 8400/2000 = 4.2  
RfC(resident) = RfC (worker) / 4.2  
                  = RfC (worker) \* 0.24

This is how USEPA 1986 did the cancer extrapolation originally, but IRIS changed the approach to Option 1.

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-----Original Message-----

From: Benson.Bob@epamail.epa.gov [mailto:Benson.Bob@epamail.epa.gov]  
Sent: Tuesday, November 04, 2008 10:26 AM  
To: brattin@syrres.com  
Subject: Exposure Calculation for Marysville Cohort

Here is the original spreadsheet I got from the UC Research Group.

(See attached file: epa07082007.xls)

Duration of exposure is in Column AT (duration\_verm\_total 1980\_1963).  
The units are years.

Cumulative exposure is in Column BS (verm\_fiber 1980\_1963). The units are (fibers-yr)/cc..

The UC team assumed that the individual was exposure 365.25 days per year. Hence the calculation of cumulative exposure by UC includes time when the individual was not working. We have to account for that calculation of overexposure in the RfC derivation. I am open to suggestions on how best to do this.

I used 5/7 to adjust the calculated cumulative exposure back to a 40 hour work week (5 days/7 days) and then used the exposure scenarios listed in the appendix to adjust to 24 hrs/day, 7 days/week.

How would you do the calculation?